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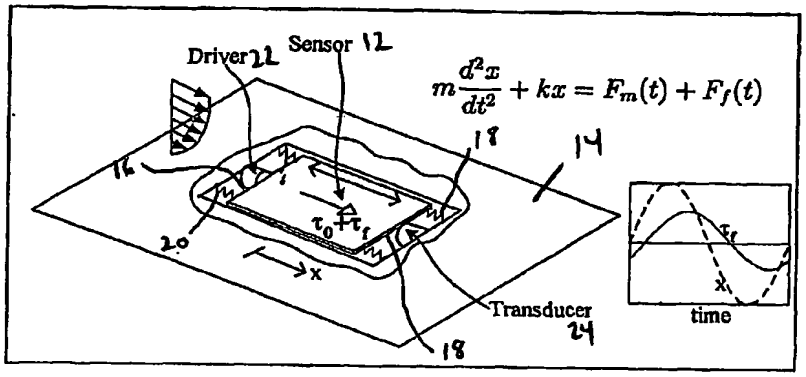
(54) Title: OSCILLATORY MOTION BASED MEASUREMENT METHOD AND SENSOR FOR MEASURING WALL SHEAR STRESS DUE TO FLUID FLOW



Schematic of dynamic resonant shear stress sensor with the governing equation and a time history of the fluctuating shear force on the sensor (from a simulation). A cutaway view of the sensor is shown to display components below the surface.

(57) **Abstract:** A shear stress sensor (10) for measuring fluid wall shear stress on a test surface is provided. The wall shear stress sensor is comprised of an active sensing surface (12) and a sensor body (14). An elastic mechanism mounted between the active sensing surface and the sensor body allows movement between the active sensing surface and the sensor body. A driving mechanism (22) forces the shear stress sensor to oscillate. A measuring mechanism (24) measures displacement of the active sensing surface relative to the sensor body. The sensor may be operated under periodic excitation where changes in the nature of the fluid properties or the fluid flow over the sensor measurably changes the amplitude or phase of the motion of the active sensing surface, or changes the force and power required from a control system in order to maintain constant motion. The device may be operated under non-periodic excitation where changes in the nature of the fluid properties or the fluid flow over the sensor change the transient motion of the active sensor surface or change the force and power required from a control system to maintain a specified transient motion of the active sensor surface.

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
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US CL : 73/841
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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U.S. : 73/841

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,464,928 A (DEALY) 14 Agust 1984 (14.08.1984), see, the entire document.	1-31
A	US 4,896,098 A (HARITONIDS et al) 23 January 1990 (23.01.1990), see the entire patent.	1-63
A	US 5,177,327 A (KNOWLES) 05 January , 1993 (05.01.1993), see all figures 1.	1-63
A	US 5,961,080 A (SINHA) 05 October 1999 (05.10.1999), see figure 3	1-63

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Continuation of B. FIELDS SEARCHED Item 3:
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search terms: boundary, drag, force, surface, sensor, shear, wall movement, periodic, flow, fluid